

Biochemical characterization and ¹H NMR based metabolomics revealed Melicope lunu-ankenda leaf extract a potent anti-diabetic agent in rats

ABSTRACT

BACKGROUND: Type 2 diabetes mellitus (T2DM) is a metabolic disorder characterized by continuous hyperglycemia associated with insulin resistance and /or reduced insulin secretion. There is an emerging trend regarding the use of medicinal plants for the treatment of diabetes mellitus. Melicope lunu-ankenda (ML) is one of the Melicope species belonging to the family Rutaceae. In traditional medicines, its leaves and flowers are known to exhibit prodigious health benefits. The present study aimed at investigating anti-diabetic effect of Melicope lunu-ankenda (ML) leaves extract. **METHODS:** In this study, anti-diabetic effect of ML extract is investigated in vivo to evaluate the biochemical changes, potential serum biomarkers and alterations in metabolic pathways pertaining to the treatment of HFD/STZ induced diabetic rats with ML extract using ¹H NMR based metabolomics approach. Type 2 diabetic rats were treated with different doses (200 and 400 mg/kg BW) of Melicope lunu-ankenda leaf extract for 8 weeks, and serum samples were examined for clinical biochemistry. The metabolomics study of serum was also carried out using ¹H NMR spectroscopy in combination with multivariate data analysis to explore differentiating serum metabolites and altered metabolic pathways. **RESULTS:** The ML leaf extract (400 mg/kg BW) treatment significantly increased insulin level and insulin sensitivity of obese diabetic rats, with concomitant decrease in glucose level and insulin resistance. Significant reduction in total triglyceride, cholesterol and low density lipoprotein was also observed after treatment. Interestingly, there was a significant increase in high density lipoprotein of the treated rats. A decrease in renal injury markers and activities of liver enzymes was also observed. Moreover, metabolomics studies clearly demonstrated that, ML extract significantly ameliorated the disturbance in glucose metabolism, tricarboxylic acid cycle, lipid metabolism, and amino acid metabolism. **CONCLUSION:** ML leaf extract exhibits potent antidiabetic properties, hence could be a useful and affordable alternative option for the management of T2DM.

Keyword: Type 2 diabetes; Melicope lunu-ankenda extract; Anti-diabetic; ¹H Nmr; Metabolomic